great mistake to jump hastily to conclusions. My only reason for these remarks on the subject is that the vacuome has been so widely homologized with the Golgi apparatus that in offering evidence for a contrary view it seemed necessary to take some account of another possible meaning of vacuoles in general.

ROBERT H. BOWEN

DEPARTMENT OF ZOOLOGY,
COLUMBIA UNIVERSITY

THE EFFECT OF HELIUM ON THE INTENSITY OF THE MERCURY SPECTRUM

RECENT researches have shown that the intensity distribution in spectra is altered by the presence of a foreign gas, the intensities of the spectral lines being, in most cases, increased.

The presence of an inert foreign gas and a radiating one might well have quite different effects on the spectrum under consideration. The author has recently studied, in the physical labroatories of Washington University, St. Louis, Missouri, the intensity of various lines in the mercury vapor spectrum as influenced by the presence of helium.

The discharge tube was an ordinary three-electrode one. Electrons from an oxide-coated filament were accelerated to full speed as they pass through a nickel grid, beyond which they travel with a constant velocity in the field free space between the grid and the plate, being finally caught by the latter. The spectrum is produced between the grid and the plate. The plate and the grid were connected to the positive terminal of a battery and the filament to the negative terminal, which was grounded. A microammeter in the plate circuit measured the electron current passing through the grid and received by the plate. This current was kept constant.

Helium, which had been stored in a reservoir, after passing slowly over activated coconut charcoal surrounded by liquid air, was admitted to the discharge tube at varying pressures. The mercury spectrum was photographed through a quartz window by means of a spectrograph and the intensities of the lines measured by the microphotometer method. The temperature of the discharge tube, and a side tube containing mercury, was kept constant, assuring a constant pressure of mercury vapor, by means of heating coils.

Five exposures, each for the same length of time, were made upon the same plate. One exposure was the spectrum from pure mercury vapor, and the others for varying pressures of helium. The accelerating potential was kept constant during each set of five exposures. There were, then, on the same plate, five spectra of mercury vapor, in which all the variables, energy of impact, mercury pressure and electron current are kept constant, and only one variable altered, *viz.*, the pressure of the helium.

In one case the plate-grid potential was nineteen volts, which is below the ionizing potential of helium; in the second case, ninety-nine volts, far above the ionizing potential. The spectrum was studied, then, as influenced by inert helium and radiating helium. Helium lines appeared strongly on the second plate but not at all on the first plate.

In both cases, the intensities of the mercury lines increase with the admission of helium, the increase continuing as the helium pressure, measured by a McLeod gauge, increases. The increase in intensity is not uniform for the various lines. Below helium pressure 0.024 mm there seem to be types of irregular changes in intensity. Because of the small number of lines studied this change can not be definitely associated with a particular series of mercury lines. Beyond this pressure the increase in the intensities of the lines is practically the same for all lines, a gradual increase being shown as the pressure of the helium increases.

Mercury lines 4,358, 4,047, 3,663, 3,341, 3,131, 3,024, 2,967, 2,652 and 2,536 were examined. With the exception of 3,663, the increase in intensity, from helium pressure 0.03 mm upward, is greater at an impact energy of nineteen volts than for ninety-nine volts. It would then seem that inert helium produced a greater increase in intensity than radiating helium. Beyond a pressure of 0.06 mm the inert and radiating helium seem to produce approximately the same intensity change.

The presence of helium would lengthen the path of the electron, keeping the electron longer in the space, and, therefore, giving them a greater chance of hitting mercury atoms, with a resulting increase in intensity. At an impact potential of nineteen volts these impacts with the helium atoms present would be elastic. At an impact potential of ninety-nine volts inelastic collisions with the helium atoms would occur and, although an increase in the path of the electron would occur, with an increase in the intensity of the mercury spectrum, yet the chance of exciting the mercury atom would be somewhat reduced compared to the chance when inert helium is present.

Since the change in intensity in different lines, however, varies, it is evident that the changes can not be entirely due to the lengthening of the path of the electron. The greatest irregularities in the changes are confined to the lower helium pressures, where the pressure of the helium is approximately that of the mercury vapor, 0.01 mm.

WILLIAM G. NASH

DEPARTMENT OF PHYSICS,
GEORGETOWN COLLEGE,
GEORGETOWN, KENTUCKY